

# **DOE Advanced Manufacturing Office Sustainable Manufacturing Workshop**

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# Sustainable Manufacturing

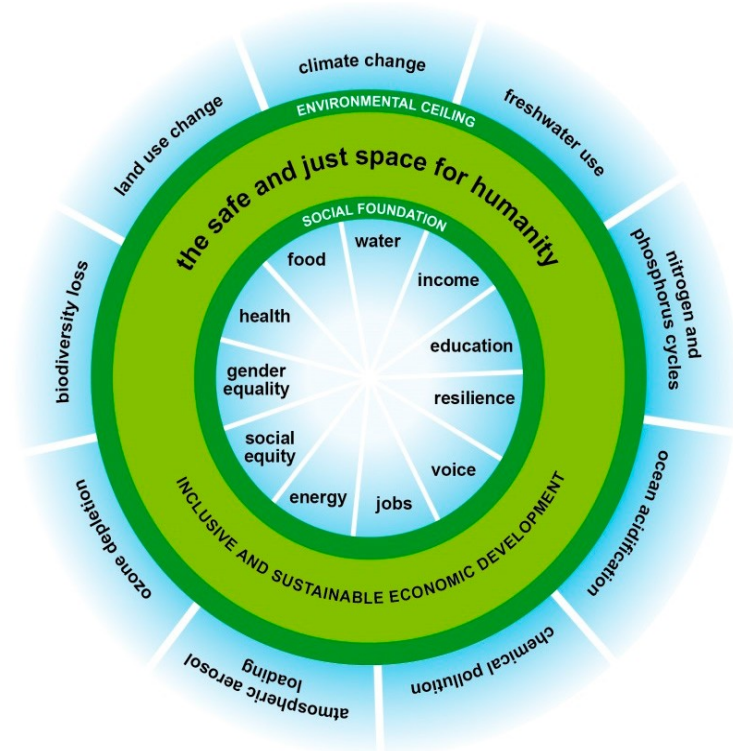


... is the economical creation of goods and services using technologies and processes that are non-polluting, conserve energy and natural resources, and are safe for employees, communities, and consumers.

# Goal: Decoupling

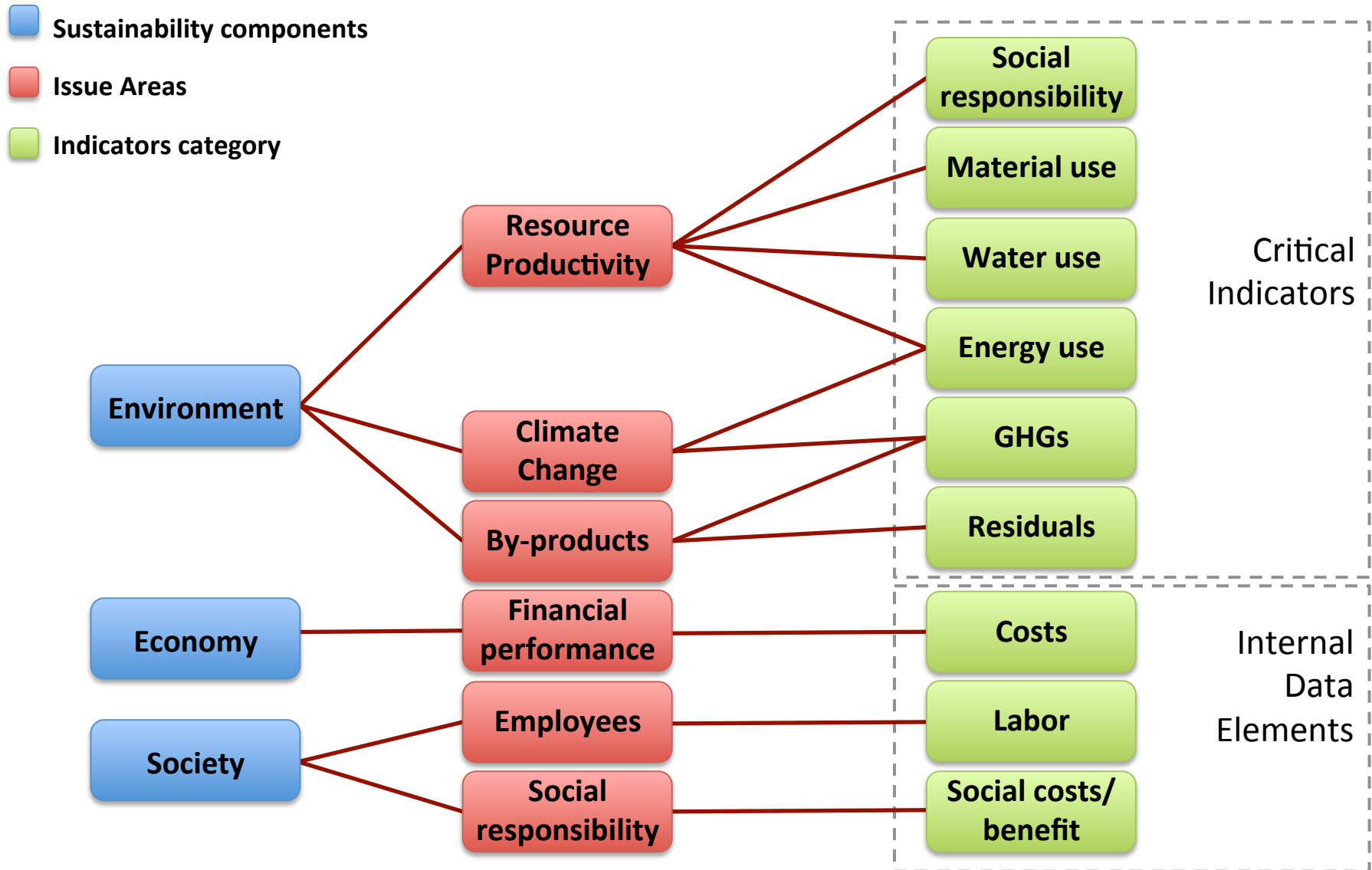
## Decoupling environmental degradation from economic growth

By 2050, humanity could devour 140 billion tons of minerals, ores, fossil fuels and biomass per year – 3X its current appetite – unless the economic growth rate is “decoupled” from the rate of natural resource consumption.

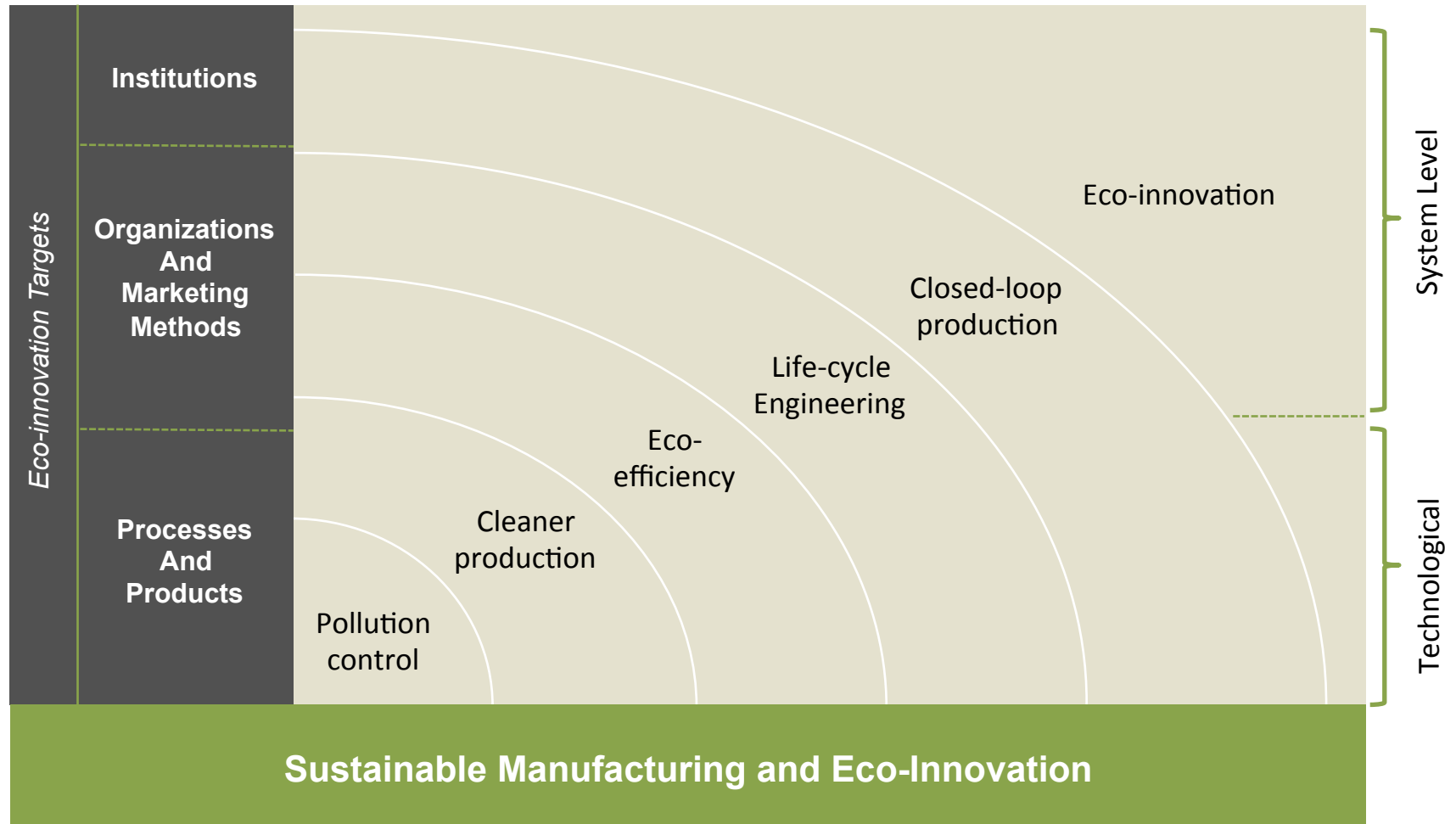


Raworth, K. et al. Oxfam: Oxford, UK, 2012.

# OECD's Sustainable Manufacturing Toolkit

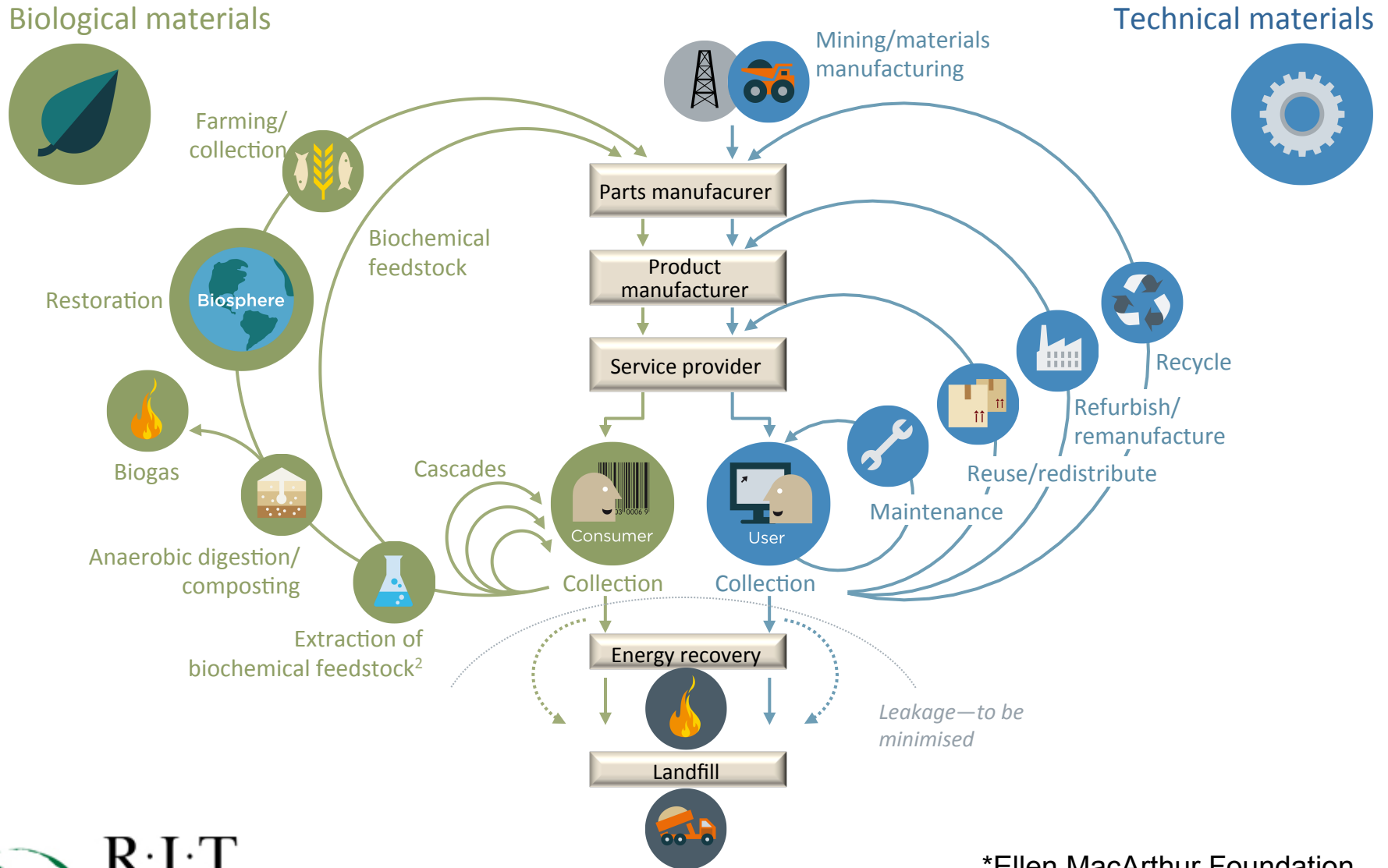


# Conceptual Relationship between Sustainable Manufacturing and Eco-Innovation\*



\*OECD, 2010

# The Circular Economy is a New System Approach\*

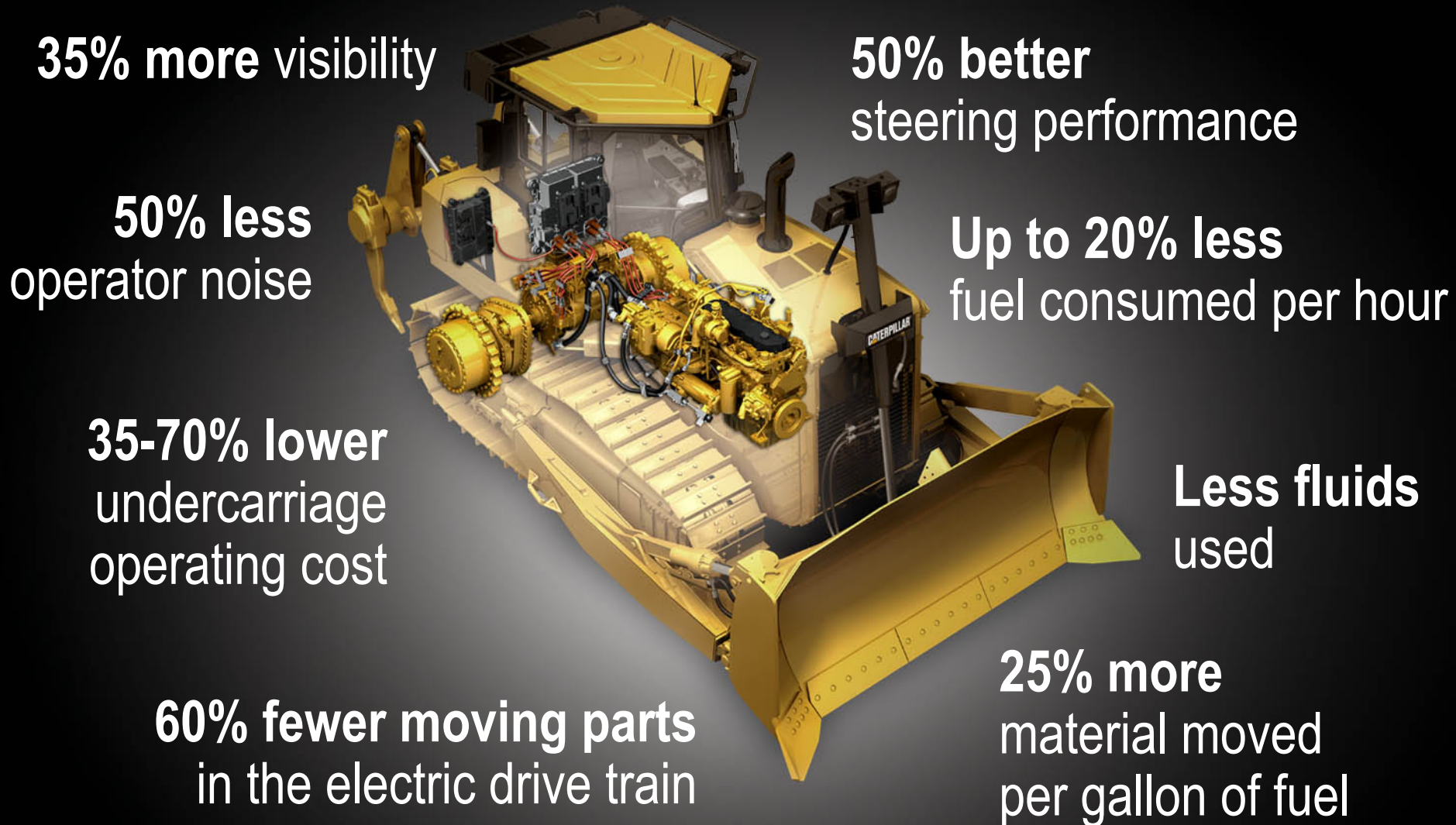


\*Ellen MacArthur Foundation



# Sustainable Manufacturing Innovative From the Inside Out\*

## Product Example



\*Caterpillar Inc.

# Examples of European Initiatives



## European Remanufacturing Network

Remanufacturing allows companies to strategically position themselves close to their customers whilst delivering economic and environmental savings. ERN helps existing remanufacturers improve their operations and encourages new business to take up remanufacturing.





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